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Fehr et al.

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(54) **OPTICS COLLECTION AND DETECTION
SYSTEM AND METHOD**

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(Continued)

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(58) **Field of Classification Search**

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Y10T 436/143333; G01N 21/6452; G01N
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See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,818,710 A 4/1989 Sutherland et al.
5,082,629 A 1/1992 Burgess, Jr. et al.

(Continued)

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FOREIGN PATENT DOCUMENTS

EP 1229133 A2 8/2002
EP 1105529 B1 11/2005

(Continued)

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OTHER PUBLICATIONS

Psaltis, Demetri, et al., "Developing Optofluidic Technology through
the Fusion of Microfluidics and Optics," *Nature*, v. 442, p. 381-386,
Jul. 27, 2006.

(Continued)

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(57) **ABSTRACT**

Optics collection and detection systems are provided for mea-
suring optical signals from an array of optical sources over
time. Methods of using the optics collection and detection
systems are also described.

14 Claims, 41 Drawing Sheets

